

R U N R E P O R T

INTEGRATED RADIOACTIVE WASTE TREATMENT SYSTEM

CAMPAIGN NO. 19, August 2, 1990 - September 13, 1990

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SRC3824

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RUN REPORT
IRTS
CAMPAIGN NO. 19

SUMMARY:

Integrated Radwaste Treatment System (IRTS) campaign 19 was initiated on August 2, 1990 and concluded on September 13, 1990 after processing 49,186 gallons of 8D-2 liquid. The target dilution factor was 3.0:1 with a nominal system flow rate of 6 gpm. This dilution ratio is based on the original 39 wt% concentration of 8D-2 supernatant and was also the dilution factor utilized during campaign 18. A total of 203 kilocuries of cesium was removed during campaign 19. The weighted average campaign 19 decontamination factor was 94,977.

As of the end of campaign 19, the total volume of supernatant removed from 8D-2 is 561,293 gallons, with approximately 222,470 gallons remaining to be processed to reduce the 8D-2 tank level down to the 32-inch heel which will remain at the completion of supernatant processing.

A target zeolite usage of 60,000 Kg, dry weight, has been set as the maximum zeolite usage for both supernatant processing and sludge washing. Sludge washing will likely require the usage of seven column charges of zeolite, plus dumping of the remaining three columns, for a total of 10 column dumps. The dry weight of zeolite for 10 column dumps is 13,831 Kg. The resulting maximum permissible zeolite usage for supernatant processing is 46,169 Kg. With the dumping of Column C, the lead column in campaign 19, a total of 31,924 Kg of zeolite has been dumped to tank 8D-1, or 69% of the maximum allowable. If each remaining supernatant processing campaign achieved throughput equal to campaign 19, supernatant processing would require five additional campaigns, with an

additional five column dumps, or 6,657 Kg dry weight of zeolite, for a total zeolite usage at the end of supernatant processing of 38,581 Kg, or 83.6% of the allowable limit. See figure 5 for a plot of zeolite usage to date.

Liquid Waste Treatment System (LWTS) received a total of 12 batch transfers from STS totaling 124,628 gallons of process liquid which was evaporated to produce 24,872 gallons of concentrates.

Cement Solidification System (CSS) processed 24,872 gallons of concentrates and produced 675 drums at 40 gallons of waste per drum. Average drum dose rate was 12 mR/hr. A total of 399 drums, or 59% of the those produced, met the requirements to qualify as shield drums, suitable for placement in the ninth layer of the Drum Cell (DC). The total CSS production, at the completion of campaign 19 was 9,675 drums.

Table 1 shows a summary of run statistics. Process completion status at the end of this campaign is 74.4% based on a total drum production of 13,000 drums.

DISCUSSION:

STS OPERATION

Campaign 19 STS operations commenced on August 2, 1990 and consisted of three STS operational phases. The first phase was performed in two consecutive weeks. Supernatant processing commenced on Thursday, August 2, 1990, upon completion of zeolite loading and leak testing of column B. Processing was terminated on August 3, 1990, upon loss of normal utility electrical power. The auxiliary electrical power generator started and operated normally. No actual loss of utility power had occurred, but a faulty phase monitor had indicated a phase had been lost and it caused the MCC-A breaker to trip and the generator to

start. The system was put into a flush mode when electrical power was stable. During the second week of phase 1, approximately 1.75 hours were lost due to failure of another phase monitor, which caused yet another electrical outage. Both failed phase monitors were replaced. A reduction of flow rate from 6 to 3 gpm was also required due to a loss of LWTs evaporator operating time, caused by a malfunction in the main plant ventilation system. Phase 1 of campaign 19 processed a total of 18,647 gallons of 8D-2 liquid. Phase 2 of campaign 19 consisted of one full week (105 hours) of supernatant feed from 8D-2 to D-001. Phase 2 of campaign 19 processed 15,901 gallons of 8D-2 liquid for a total of 34,548 gallons processed to this point in the campaign. Decontamination factors observed during the later stages of phase 1 and during phase 2 were in the order of magnitude of 10^5 with one transfer batch exceeding 200,000. The exceptionally high DFs and low system effluent cesium concentrations are attributable to a four column configuration with all columns performing as expected, each contributing in some measure to the overall system decontamination factor.

Upon system start-up for phase 3, it was discovered that valve HCV-004, which supplies back pressure on the pre-filter recirculation line, was nearly wide open when a full closed air signal was sent to the valve from the HIC-004 controller. The back pressure supplied by this valve provides the motive force required to produce flow through the sintered metal pre-filter to the supernatant feed tank D-001. Even though the valve was not functioning, the desired flow to tank D-001 could be achieved by increasing the pump G-001 speed setting. The replacement jumper for HCV-004 has been prepared for use and will be placed into the STS valve aisle in the near future as scheduling permits. Phase 3 of campaign 19 was completed without further problems. STS processing was discontinued due to the loading level of the lead column, which reached approximately 98%. At the latter stages of many previous campaigns, the

limiting factor which determined run termination was the system effluent cesium concentration, with the lead columns loaded to approximately 92-94% at time of termination.

Column C, which was the lead column during this campaign, was emptied of spent zeolite by dewatering of the column, then removing the bottom plug, and dumping the entire column of zeolite out of the open bottom dump valve. This method was used on one prior column dump; that following campaign 17, when column A was dumped using this method. This method of dumping the column has the advantage of dumping the zeolite under the individual column, not in one pile as is the case with the alternate method of sluicing the zeolite from the column via the J-nozzle and then dumping the remaining bottom heel of zeolite from the bottom plug.

LWTS OPERATION

Operation of the high TDS system, specifically evaporator 31017 and its associated subsystems, continued to be satisfactory throughout campaign 19. The LWTS operation was interrupted once for approximately 2 hours to replace a faulty evaporator 31017 density transmitter. LWTS operation was interrupted for approximately six hours due to a malfunction of the main plant ventilation system (see also UOR 90-13-VEC-1). In both cases, the system was placed in short term layup during the interruptions.

Steam flow rates to the evaporator 31017 were sufficient to maintain pace with the STS flow rate of 6 gpm and to makeup for the above mentioned interruptions of operation.

CSS OPERATION

The high shear cement solidification system produced a total of 675 drums of low level waste at 40 gallons of waste per drum. During campaign 19, a total of 399 low dose shield drums, suitable for placement in the drum cell top (ninth) layer, were produced and have been segregated in the drum cell.

A gel time of 120 minutes was obtained by lab. analysis for a sample, Lab Log Number 9002297, of concentrates tank 5D-15A2. The acceptable gel time is a minimum of 5 minutes and a maximum of 30 minutes per WVNS-PCP-001 (Process Control Plan). One drum of this waste was produced per a work order, number 9002224, to perform an in-process gel test. The gel time obtained in the in-process test was 15 minutes, an acceptable gel time. A meeting was conducted to discuss and evaluate the gel times (see minutes of this meeting, letter DC:90:0091). It was decided that for any concentrated batch with a gel time out of tolerance per WVNS-PCP-001, one drum would be produced and sampled for an in-process gel test. The system would be put on hold until the in-process gel test is performed and verification made that this gel time is within the acceptable limits. The concentrates in tank 5D-15A2 were processed through the CSS without any further problems. A subsequent concentrates batch in tank 5D-15A1, lab log number 9002350, had a gel time longer than the acceptable maximum time of 30 minutes. The in-process gel test yielded a gel time which was also in excess on the limit. The system remained in standby while further evaluation was performed. It was determined that the calcium nitrate in the cement was not sufficient. The remaining cement was emptied from the silo and the silo refilled with cement containing the proper amount of calcium nitrate. With this corrective action, gel times from that point onward have been within the specification limits of WVNS-PCP-001.

The compressive strength of cube samples of concentrates solutions must be >500 PSI. The initial cube sample of concentrates tank 5D-15A1, lab log number 9002350, met this criteria. However, a test after 7 days cure time yielded a result of 493 PSI. NR 90-068 was issued by QA per WVNS-PCP-001, section 5.12. A drum of this cemented waste was subjected to a tipper test. All criteria were found to be acceptable. This drum will be set aside for future core boring.

CSS processing time was lost due to power outages of the main plant when the auxiliary generator did not function properly (see CM 90109) and due to a power failure at the drum cell caused by a tree falling on the power supply lines.

DRUM CELL OPERATION

Operation of the RTS Drum Cell continued in support of CSS operations.

A tree which fell on the incoming utility electrical power lines caused the drum cell to lose electrical power. The drum cell was without power for approximately 12 hours.

Other than the above mentioned problem, the RTS drum cell operated without difficulty.

DECONTAMINATION FACTORS:

A graph of the decontamination factors (DF) obtained in STS is shown in figure 3. Transfer DF is the instantaneous factor, calculated for each transfer from STS to LWTS. Cumulative DF is the weighted average of the transfer DF's. The shape of the lines shown in figure 3 is typical of previous campaigns.

TANK LEVELS:

This campaign continued to reduce the volume in tank 8D-2 by processing supernatant. A graph of 8D-1 and 8D-2 levels since January 1988 is included for information, see figure 4. This figure shows 8D-1 stable for this campaign. The level in 8D-1 will be maintained at a minimum of 50 inches for ballast and shielding purposes. A target level of 32 inches for completion of supernatant processing is shown for 8D-2.

PRODUCT ACCEPTANCE:

The waste form classification analyses for drums produced is as follows:

- * Campaign 11, Class "C" Low Level waste; verification complete.
- * Campaign 12, Class "C" Low Level Waste; verification complete.
- * Campaign 13, Class "C" Low Level Waste; verification in progress.
- * Campaign 14, QA update in progress.
- * Campaign 15, Awaiting QA update.
- * Campaign 16, Awaiting QA update.
- * Campaign 17, Awaiting QA update.
- * Campaign 18, Awaiting QA update.

Table 7, Summary of Suspect Drums and Test Results, contains a list of all drums that have not been produced in accordance with the Process Control Plan (PCP).

STS Breakthrough Curve

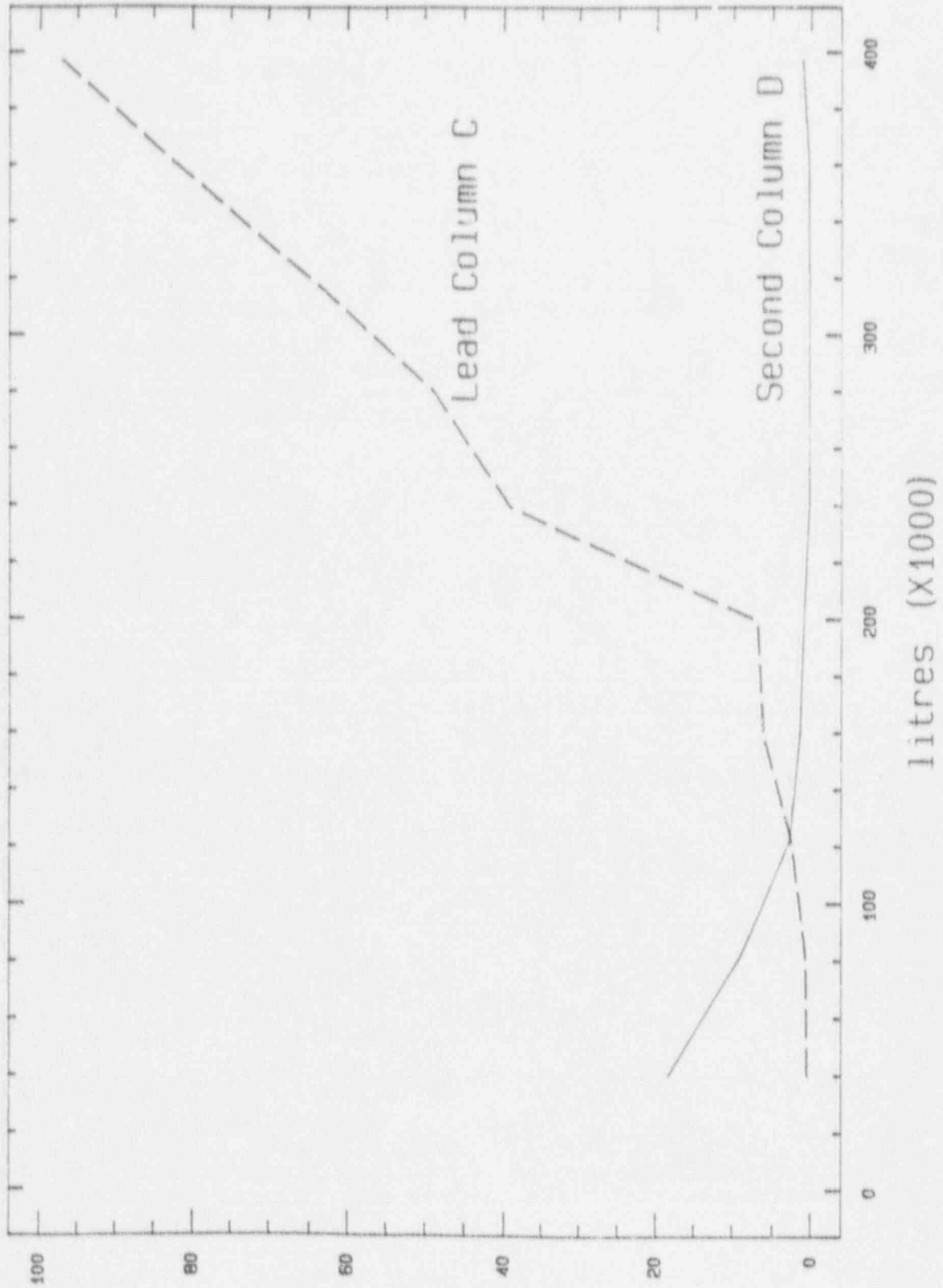
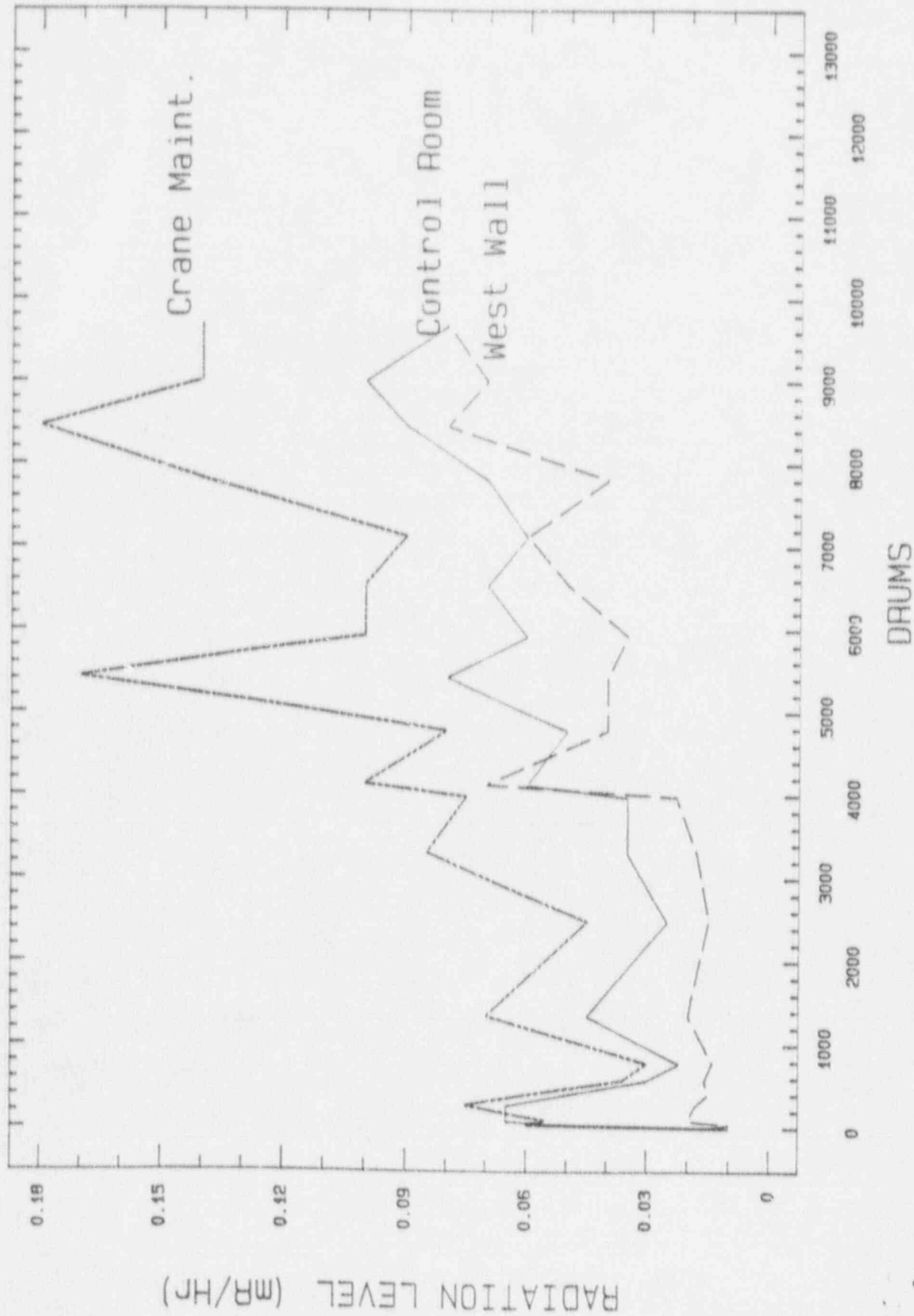


Figure 1
Column Breakthrough Percent

DRUM CELL RADIATION LEVELS



STS DECONTAMINATION FACTOR

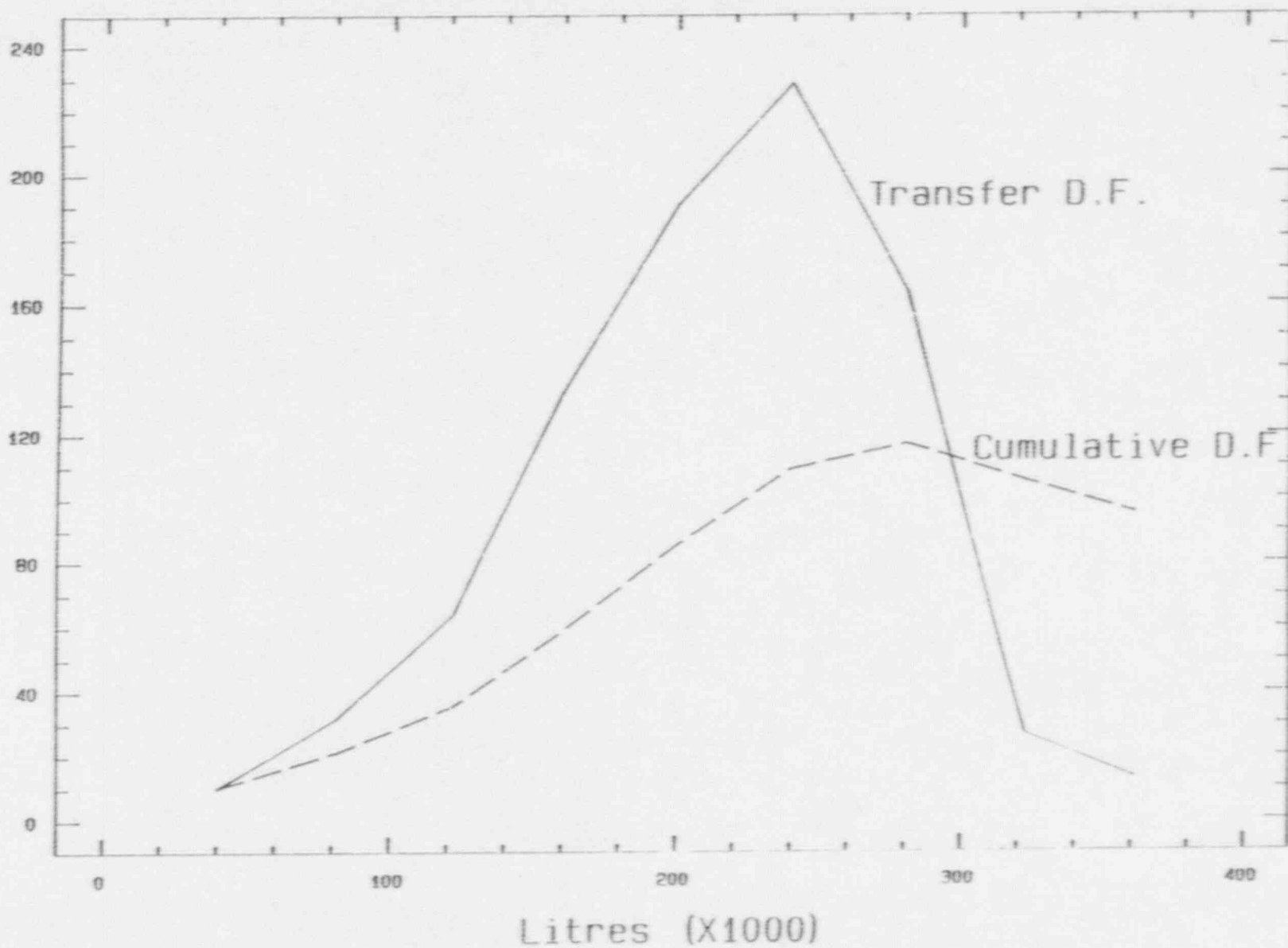
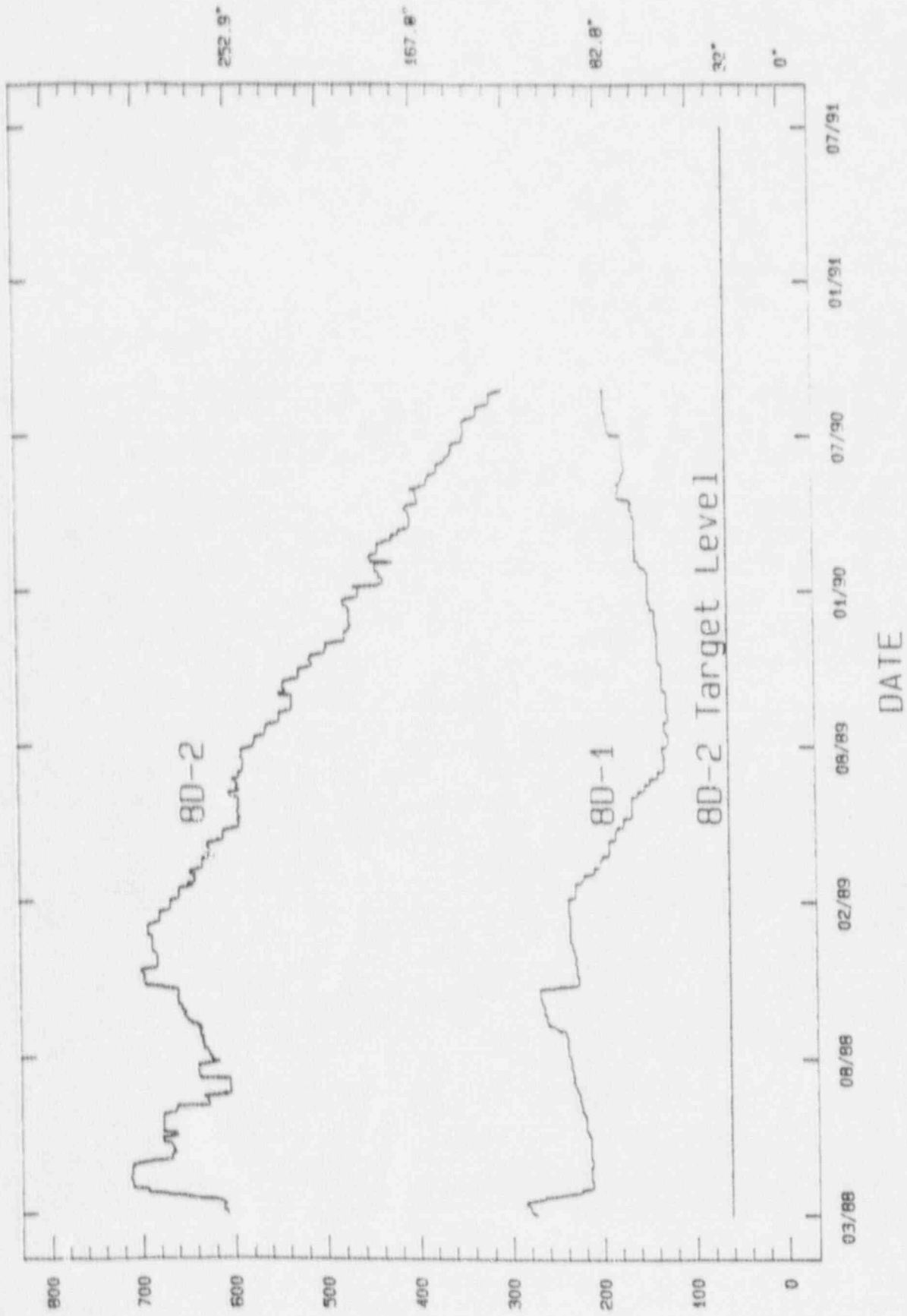


Figure 3
Decontamination Factor (X1000)

I R T S HIGH LEVEL WASTE TANKS
80-1 & 80-2



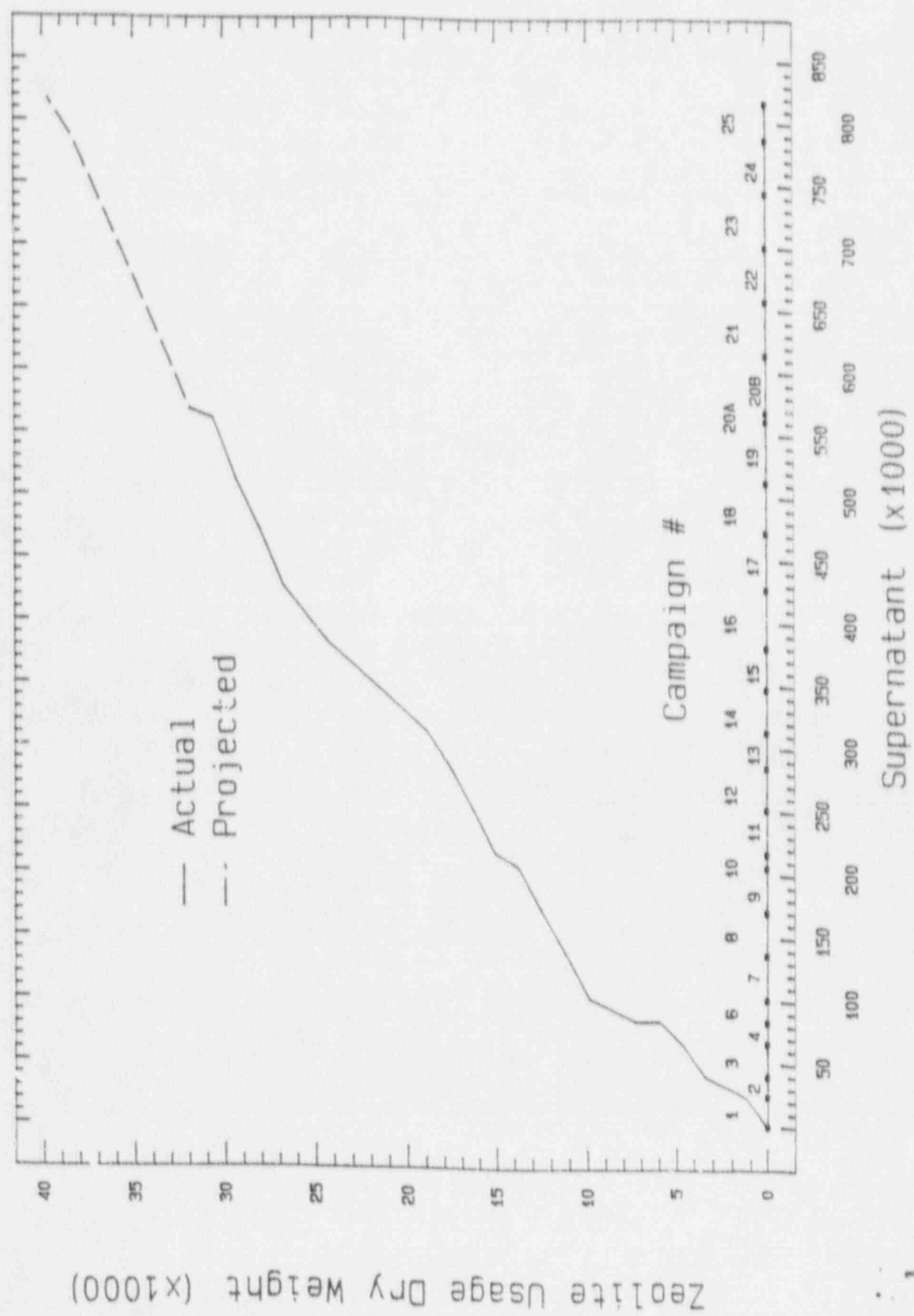
GALLONS (X1000)

Figure 4

D:911005

JANUARY 17, 1991

Zeolite Usage For Supernatant Processing



Zeolite Usage Dry Weight (x1000)

TABLE 1
IRTS CAMPAIGN NO. 19 RUN REPORT
SUMMARY TABLE OF RUN STATISTICS

1.	TRANSFERS 8D-3 TO 5D-15B			
	A.	Campaign Nos. 1 thru 18	5,239,134 L	1,384,171 gal.
	B.	Campaign No. 19 Total	<u>465,787 L</u>	<u>123,048 gal.</u>
		TOTAL TO DATE	5,704,921 L	1,507,219 gal.
2.	LWTS PROCESS VOLUMES			
2.1	Total Feed to Evaporator			
	A.	Campaign Nos. 1 thru 18	5,256,837 L	1,388,714 gal.
	B.	Campaign No. 19	<u>471,767 L</u>	<u>124,628 gal.</u>
		TOTAL TO DATE	5,728,604 L	1,513,342 gal.
2.2	Total Concentrate			
	A.	Campaign Nos. 1 thru 18	1,264,649 L	334,117 gal.
	B.	Campaign No. 19	<u>103,020 L</u>	<u>27,218 gal.</u>
		TOTAL TO DATE	1,367,787 L	361,335 gal.
3.	DRUMS PRODUCED*			
	A.	Campaign Nos. 1 thru 18	9,000	
	B.	Campaign No. 19	<u>675</u>	
		TOTAL TO DATE	9,675	
4.	CURIES OF CESIUM 137 REMOVED FROM 8D-2			
	A.	IRTS Campaign Nos. 1 thru 18	4,604 K Ci	
	B.	IRTS Campaign No. 19	<u>203 K Ci</u>	
		TOTAL	4,807 K Ci	
5.	PROCESS COMPLETION			
	A.	Curies Percent Complete:		
		$\frac{4807}{7,089-489} = 0.742$	or 74.2 percent	
	B.	Drums Percent Complete:		
		$\frac{9,675}{13,000} = 0.744$	or 74.4 percent	

* Includes 7 drums removed from pile and core bored (#72847, 72791, 72949, 71004, 72813, 71144, 72835) which are now located in Lag Storage.

TABLE 2
IRTS CAMPAIGN NO. 19 RUN REPORT
COMPARISON OF STATISTICS FROM PREVIOUS CAMPAIGNS TO THIS CAMPAIGN

	<u>CAMPAIGN NO. 17</u>	<u>CAMPAIGN NO. 18</u>	<u>CAMPAIGN NO. 19</u>
<u>S T S</u>			
Volume of 8D-2 Supernatant ^(a) Processed (Gal.)	45,236	39,804	49,186
Total Volume Processed (Includes flush and dilution Water) (Gal.)	142,615	112,510	123,048
Column Breakthrough (%)			
- Lead Column	75	65	97
- 2nd Column	0.2	1	1.2
Average System DF	34,401	33,642	94,977
Average Cs-137 in Effluent (uCi/mL)	.032	0.02	.017
<u>L W T S</u>			
Concentrates			
- Volume (Gal.) ^(b)	26,134	21,747	27,218
- Average Cs-137 (uCi/mL)	.22	.11	.072
<u>C S S</u>			
Drums Produced	643	549	675
Average Cs-137/Drum (Ci)	.028	.021	.01
Average Drum Contact Dose Rate (mR/hr)	32	20	12

(a) See Table 6 for volume of supernatant recycled.

(b) Tank heels:

	<u>CAMPAIGN 17</u>	<u>CAMPAIGN 18</u>	<u>CAMPAIGN 19</u>
5D-15A1 - 20 Gallons	20 Gallons	20 Gallons	20 Gallons
5D-15A2 - 2 Gallons	2 Gallons	2 Gallons	2 Gallons
70-D-1 - 40 Gallons	50 Gallons	50 Gallons	68 Gallons
TOTAL	62 Gallons	72 Gallons	90 Gallons

TABLE 3
I R T S CAMPAIGN NO. 19 RUN REPORT
DETAILED TABLE OF RUN STATISTICS

COLUMN SEQUENCE: C-D-A-B

Transfer 8D-3 to 5D-15B	1	2	3	4	5	6	7	8	9	10	11	12
A. Date	8/03/90	8/06/90	8/08/90	8/09/90	8/10/90	8/20/90	8/22/90	8/23/90	8/24/90	9/05/90	9/05/90	9/07/90
B. STS Flow Rate (gpm)	6.0	6.0	6.0	6.0	N/A	6.0	6.0	6.0	N/A	6.0	6.0	N/A
C. D-001 Sample No.	9002230	9002248	9002262	9002317	9002341	9002390	9002405	9002438	9002459	9002505	9002527	9002548
i. Cs-137 (uCi/mL)	465	544	532	538	623	601	547	548	580	607	646	606
ii. TDS (wt %)	9.94	11.27	11.63	11.03	11.03	11.03	11.27	11.15	11.75	12.84	13.23	12.74
iii. Density (gr/mL)	1.069	1.080	1.083	1.078	1.078	1.078	1.080	1.079	1.084	1.093	1.096	1.09
D. Cesium-137 Activity (Column Effluents) (uCi/mL)												
i. Lead Column C	1.30	3.70	14.00	33.00	42.20	N/A	N/A	215.00	284.00	400.00	533.00	588.00
ii. 2nd Column D	0.33	0.33	0.38	0.45	0.37	0.35	0.41	0.41	0.45	0.78	1.99	7.00
E. Column Breakthrough (%)												
i. Lead Column C	0.4	0.7	2.6	6.1	6.8	N/A	N/A	39.2	49.0	65.9	82.5	97.0
ii. 2nd Column D	18.3	8.9	2.7	1.4	0.9	N/A	N/A	0.2	0.2	0.2	0.4	1.2
F. 8D-3 Sample No.	9002240	9002254	9002289	9002330	9002346	9002401	9002420	9002442	9002461	9002510	9002541	9002562
i. Cs-137 (uCi/mL)	0.0298	0.0083	0.0074	0.0039	0.0035	0.0022	0.0021	0.0023	0.0064	0.0159	0.0419	0.0802
ii. TDS (wt %)	6.57	5.72	10.43	10.67	11.05	7.77	9.94	10.91	11.27	9.22	11.27	12.60
iii. Density (gr/mL)	1.041	1.034	1.073	1.075	1.078	1.051	1.069	1.077	1.080	1.063	1.080	1.091
G. STS System DF												
i. Transfer DF	10,004	31,964	64,139	132,396	N/A	190,215	228,485	N/A	86,064	26,661	12,942	N/A
ii. Cumulative DF	10,044	21,254	35,461	57,946	N/A	71,753	94,422	N/A	82,612	69,426	64,356	N/A
H. 5D-15B Sample No.	9002245	9002267	9002315	9002349	9002361	9002409	9002444	9002455	9002469	9002533	9002554	9002571
i. Cs-137 (uCi/mL)	0.0260	0.0121	0.0081	0.0045	0.0046	0.0021	0.0024	0.0034	0.0061	0.0204	0.0441	0.0780
ii. TDS (wt %)	8.01	8.01	9.94	10.55	13.56	9.10	10.31	10.91	10.21	9.94	11.75	12.36
iii. Density (gr/mL)	1.053	1.053	1.069	1.074	1.099	1.062	1.072	1.077	1.074	1.069	1.084	1.089
I. Volume Received (Litres) in 5D-15B	39,952	41,816	40,510	36,930	36,210	40,489	39,889	40,784	32,530	42,179	38,589	35,909
J. Cumulative Volume* for Campaign (Litres)	39,952	81,768	122,278	159,208	195,418	235,907	275,796	316,580	349,110	391,289	429,878	465,787

* Does not include flush (see Row "B") transfers.

TABLE 4
I R T S CAMPAIGN NO. 19 RUN REPORT
DRUM TESTING RESULTS

CONCENTRATES BATCH	72	73	74	75	76	77	78
LWTS TANK	5D-15A2	5D-15A1	5D-15A2	5D-15A2	5D-15A1	5D-15A2	5D-15A1
LAB ANALYSIS NO.	9002297	9002350	9002362	9002450	9002474	9002563	9002581
TOTAL SOLIDS %	39.63	39.54	39.26	39.74	40.1	38.66	38.05
Cs-137 CONCENTRATION ($\mu\text{Ci/mL}$)	805 E-02	3.97 E-02	1.74 E-02	1.37 E-02	1.82 E-02	1.06 E-1	2.32 E-1
POUNDS CEMENT +CaNo ₃	36,024	54,264	24,624	50,160	52,896	47,880	41,952
NUMBER OF DRUMS	79	119	54	110	116	105	92
TOTAL GALLONS	3,160	4,760	2,160	4,400	4,640	4,200	3,680
CURIES PER DRUM (AVERAGE)	0.012	0.006	0.003	0.002	0.003	0.016	0.035
RADIATION DOSE (mR/hr) PER DRUM	20	7	4	4	4	14	33
PRESOLIDIFICATION RESULTS	>700 PSI	>700 PSI	>700 PSI	>700 PSI	>700 PSI	>700 PSI	>700 PSI
IN-CELL TEST RESULTS DRUM NO./PSI	79723 >700 PSI	80469 >700 PSI	80327 >700 PSI	80743 >700 PSI	80548 >700 PSI	80858 >700 PSI	80885 >700 PSI
Total Cement & CaNo ₃	307,800 LBS.						
Total Number of Drums	675						
Total Volume Solidified	27,000 Gallons						
Total Curies Cs-137 Solidified	7.28 Ci						

TABLE 5
I R T S CAMPAIGN NO. 19 RUN REPORT
DRUM PRODUCTION RATES

	<u>DATE</u>	<u>DAILY AVERAGE</u>	<u>WEEKLY TOTAL</u>	<u>CUMULATIVE TOTAL</u>
Campaign #1	6/1 to 6/17	33		401
Campaign #2	6/27 to 7/8	45		783
Campaign #3	7/18 to 8/5	35		1347
Campaign #4	8/22 to 9/26	30		1681
Campaign #6	12/5 to 12/13	45		2009
Campaign #7	1/23 to 2/23	50		2607
Campaign #8	3/6 to 4/13	60		3303
Campaign #9	4/24 to 5/26	58		3988
Campaign #10	6/19 to 6/22	37		4136
Campaign #11	7/26 to 8/24	58		4778
Campaign #12	9/5 to 10/13	50		5421
Campaign #13	10/23 to 11/10	62		5921
Campaign #14	11/20 to 12/15	67		6532
Campaign #15	1/22 to 2/14	59		7124
Campaign #16	3/12 to 4/16	42		7808
Campaign #17	5/08 to 6/15	60		8451
Campaign #18	6/28 to 7/25	45		9000
Campaign #19	8/9	17		
	8/10	58	75	9075
	8/13	12		
	8/14	9		
	8/15	55		
	8/16	64		
	8/17	37	177	9262
	8/27	26		
	8/28	19		
	8/29	9		
	8/30	63		
	8/31	59		
	9/1	17	193	9445
	9/4	33	33	9478
	9/10	34		
	9/11	60		
	9/12	50		
	9/13	53	197	9675

TABLE 6
IRTS CAMPAIGN NO. 19 RUN REPORT
STS PROCESS HISTORY

CAMPAIGN	DATE	NOMINAL DILUTION RATIO	COLUMN SEQUENCE	COLUMN(S) DUMPED	Cs-137 CONCENTRATION IN 80-2 (uCi/mL)	SUPERNATANT PROCESSED				TOTAL Cs-137 REMOVED KCi	Cs-137 INVENTORY REMAINING IN 80-2(a)(b) KCi
						AND TRANSFERRED TO LWTS GALLONS	Cs-137 REMOVED KCi	AND RECYCLED TO 80-2 GALLONS	Cs-137 REMOVED KCi		
1	5/88	no dilute	B-C-D-A	B	2860	24,185	262	0	0	262	6,836
2	6/88	no dilute	C-D-A-B	C	2600	15,800	155	0	0	155	6,681
3	7/88	no dilute	D-A-B-C	D	2600	26,356	259	0	0	259	6,422
4	8/88	no dilute	A-B-C	A	2600	17,000	167	4,000	39	206	6,215
5	9-10/88	no dilute	N/A	B&C	2400	0	0	30,200	274	274	5,942
6	12/88	no dilute	A-B-C-D	A	1980	17,800	133	0	0	133	5,809
7	1-2/89	2:1	B-C-D-A	B	1980	35,342	265	0	0	265	5,544
8	2-3/89	2:1	C-D-A-B	C	1980	34,040	255	0	0	255	5,289
9	4-5/89	2:1	D-A-B-C	D	1980	35,101	263	0	0	263	5,026
10	6/89	2:1	A-B-C	A	1885	10,900	78	13,200	31	109	4,917
11	8/89	2:1	B-C-A	B	1885	35,096	250	0	0	250	4,667
12	10/89	2:1	C-D-A-B	C	1885	33,363	238	0	02	238	4,429
13	10-11/89	2:1	D-A-B-C	D&A	1855	28,333	199	14,767	42	241	4,188
14	12/89	2:1	B-C-A	B&C	1810	33,873	232	19,180	131	363	3,825
15	1-2/90	2:1	D-A-C	D&A	1810	33,300	228	34,434	202	430	3,395
16	3-4/90	3.6:1	C-A-B	C	1790	46,578	316	0	0	316	3,079
17	6/90	3.6:1	A-B-C-D	A	1790	45,236	315	1,458	7	315	2,764
18	8/3/90	3.0:1	B-C-D-A	B	1790	39,804	270	0	0	270	2,494
19	9/13/90	3.0:1	C-D-A-B	C	1090	49,184	203	0	0	203	2,291
						561,291	4,088	117,239	726	4,807	

(a) Total curies of Cesium-137 reported in Safety Analysis Report (SAR) report decayed to 7-21-88 = 7,098 KCi minus curies of Cesium-137 processed.

(b) Includes approximately .489 kCi Cesium-137 left in 32-inch heel in Tank 80-2 at the end of supernatant processing estimated as follows:

Volume of 32 inch heel = 80,464 gallons
 Volume of solids in heel = 7,548 gallons
 (Ref.: DOE/NE-44139-14, Page A2)
 Volume of supernatant in heel = 72,916 gallons
 Curies of CS-137 in heel = 489 KCi

$$\frac{[(7.29 \text{ E}+04 \text{ gal})(3.785 \text{ E}+03 \text{ mL/gal})(1.79 \text{ E}+03 \text{ uCi/mL})]}{10^6 \text{ uCi/Ci}}$$

TABLE 7
IRTS CAMPAIGN NO. 19 RUN REPORT
SUMMARY OF SUSPECT DRUMS

DATE PRODUCED	CAMPAIGN NUMBER	DRUM SERIAL NUMBER	CRITIQUE NUMBER	NON-CONFORMANCE REPORT	DESCRIPTION OF SUSPECT CONDITION
7/29/88	3	72847	CM88083	NR 88-055	One batch in drum produced without sodium silicate.
2/06/89	7	73033	CM89013	NR 89-011	
5/10/89	9	74014	CM89056	N/A	
4/12/90	16	78922	CM90049	NR 90-017	
6/29/90	18	79835	CM90077	N/A	
8/11/89	11	75903	CM89101	NR 89-066	
1/23/89	7	71397	N/A	NR 89-015	Low water-to-cement ratio (i.e. 0.526). Acceptable range is 0.54 to 0.70.
11/20/89	14	77074	CM89135	NR 89-148	Incomplete antifoam addition to mixer.
	14	77073			
	14	77314			
	14	77305			
	14	77304			
	14	77405			
	14	77331			
	14	77401			
	14	77330			
	14	77333			
	14	77344			
	14	77345			
	14	77402			
	14	77404			
	14	77403			
	14	77328			
	14	77303			
	14	77399			
	14	76994			
	14	77212			
14	77228				
14	77222				
8/27/90	19	80326	CM90106		
	19	80329			
	19	80198			
	19	80199			
	19	80200			
	19	80401			
	19	80404			
	19	80403			
	19	80400			
	19	80405			
19	80398				
19	80399				
19	80203				

TABLE 7
IRTS CAMPAIGN NO. 19 RUN REPORT
SUMMARY OF SUSPECT DRUMS

(CONTINUATION)

DATE PRODUCED	CAMPAIGN NUMBER	DRUM SERIAL NUMBER	CRITIQUE NUMBER	NON-CONFORMANCE REPORT	DESCRIPTION OF SUSPECT CONDITION
	19				
7/05/88	2	71542	CM90042	N/A	Low water-to-cement ratio.
7/24/88	3	72539	CM90042	N/A	
8/23/88	4	72331	CM90042	N/A	
10/10/89	12	76392	CM90042	N/A	
11/20/89	14	77401	CM90042	N/A	
11/20/89	14	77213	CM90042	N/A	
12/15/89	14	77829	CM90042	N/A	
12/14/89	14	77523	CM90042	N/A	
3/26/90	16	78091	CM90042	N/A	
4/19/90	16	78671	N/A	NR 90-019	
7/25/90	18	79915	CM90093	N/A	